

## 4.11 NOISE

### 4.11.1 METHODOLOGY

#### *PROJECT CONSTRUCTION AND OPERATIONAL NOISE LEVELS*

A noise model was developed to predict noise levels generated by both project construction and operation at the alternative project sites. The software used was CADNA/A, a sophisticated program developed by DataKustik, GmbH, Munich, Germany. The algorithms in CADNA/A are based on the International Standard ISO-9613-2 “Attenuation of Sound during Propagation Outdoors” (CH2MHill, 2005) (DEIS Vol. III, **Appendix U**).

Input to the model included the locations of the noise sources and receptors, source sound power levels, atmospheric conditions, ground conditions, and the presence and condition of structures or terrain features that would block or reflect noise. The model divides the proposed facility into individual point and area noise sources representing each piece of equipment or activity that produces a significant amount of noise. The effects of noise mitigation measures that would normally be part of the facility are included in the model.

Using these standard power levels as a basis, the model calculates the sound pressure level that would occur at each receptor from each source after losses from distance, air absorption, blockages, and ground effects are considered. The sum of all these individual levels is the total project noise level at the modeling point. The model estimates noise levels at specific receptor locations of interest (residential areas) and also generates contours of equal noise levels.

The predicted project noise levels were compared to the noise criteria identified by the Washington Administrative Code (WAC). WAC establishes the maximum permissible noise levels applicable to noise received at noise-sensitive areas, including residences (Class A EDNA [environmental designation for noise abatement]) from a commercial facility (Class B EDNA) as 57 A-weighted decibels (dBA) for the daytime and 47 dBA at nighttime. If these criteria were exceeded, the model was used to evaluate available mitigation measures. The mitigation measures necessary to comply with the criteria were identified or, if no mitigation measures were adequate, the impacts were identified as unavoidable.

#### *Project Construction Noise Levels*

During the construction phase, noise from construction activities would dominate the noise environment in the immediate area. Equipment used for construction would generate noise levels as indicated in **Table 4.11-1**. Maximum noise levels from different types of equipment under different operating conditions could range from 85 dBA to 88 dBA at a distance of 50 feet. Construction activities would be temporary in nature, typically occurring during normal working hours.

Construction noise impacts would be significant if nighttime operations or use of unusually noisy equipment resulted in annoyance or sleep disruption for nearby residences.

**TABLE 4.11-1**  
TYPICAL CONSTRUCTION NOISE LEVELS

Type of Equipment	Maximum Noise Level dBA at 50 feet
Scrapers	88
Bulldozers	87
Heavy Trucks	88
Backhoe	85
Pneumatic Tools	85

Source: Bolt, Beranek, and Newman, 1971.

The construction equipment that would be used for both sites was identified for the following major construction phases:

- Mass earthwork;
- Fine grading/utility construction; and
- Road construction.

Typical sound pressure levels, frequency distributions, and usage factors for each piece of construction equipment were combined to determine the overall equivalent sound pressure levels by octave band. Using this approach, it was determined that the mass earthwork phase would generate the loudest construction noise levels. The noise generated by the mass earthwork phase was modeled as an area source covering each of the project alternative sites. It was assumed that all equipment was in operation.

#### ***Operational Noise Levels***

The equipment and activities that would potentially generate high noise levels during project operation were identified as:

- Emergency backup 2-megawatt diesel engine generators;
- Daytime loading dock activity;
- On-site customer and delivery traffic;
- Wastewater treatment plant operation; and
- Exhaust fans for underground wastewater pump station.

Adverse noise impacts could occur from the emergency backup diesel engine generators. However, these generators would only be used 1) in the event of a power failure and 2) for maintenance

purposes once per week for 30 minutes. Information available from existing acoustical literature was used to define the sound power levels, by octave band, for the engine casings and the exhaust. Information on the other equipment and activities was taken from existing acoustical literature (CH2MHill, 2005) (DEIS Vol. III, **Appendix U**).

#### *Traffic Noise Levels*

Traffic noise levels were evaluated using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model (FHWA-RD-77-108) as coded into the Traffic Noise Model (TNM) Version 2.5 computer program. FHWA's TNM is the analytical method currently favored by many state and local agencies, including the Washington State Department of Transportation (WsDOT), for highway traffic noise prediction. TNM is based upon reference energy emission levels for automobiles, medium trucks (two axles) and heavy trucks (three or more axles), with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The model uses the traffic noise emission curves recommended by FHWA to calculate noise levels generated by highway traffic. The predicted traffic noise levels were compared to the noise abatement criteria (NAC) of 66 dBA, which is the WsDOT threshold for significant traffic noise impacts (CH2MHill, 2006b) (refer to the discussion in **Section 3.11** Noise for more detail).

### **4.11.2 ALTERNATIVE A – PREFERRED CASINO-RESORT PROJECT**

#### *CONSTRUCTION NOISE IMPACTS*

The estimated construction noise levels during the mass earthwork phase of Alternative A are shown in **Figure 4.11-1**. Specific residential areas near the sites are labeled "Rx." The construction noise levels at the closest residential areas for both sites are predicted to be generally in the range of 63 dBA to 73 dBA. This range is based on calculated noise construction levels at specific locations around the project site. The methodology used to obtain these construction noise levels is discussed in the Noise Technical Report (CH2MHill, 2005) (DEIS Vol. III, **Appendix U**). Noise levels during the other construction phases would be only 1 dBA to 3 dBA lower. Construction activities are exempt from the WAC daytime limits (7 a.m. to 10 p.m.). However, the nighttime WAC limits do apply to construction activities and these levels are all well above the NAC level of 47 dBA. This is considered a significant impact. Implementation of mitigation measures in **Section 5.0** would ensure that nighttime construction noise impacts are reduced to less than significant.

#### *OPERATIONAL NOISE IMPACTS*

##### *On-Site Operations Noise*

The results of the initial modeling of the daytime operational noise from Alternative A are shown in **Figure 4.11-2**. This figure represents equipment and activities with typical noise control. This includes operating only one enclosed diesel engine generator set at any given time, diesel engine silencers, a berm around the wastewater treatment plant, treatment plant fan silencers, and a noise

**Figure 4.11-1**

**Figure 4.11-2**

barrier between the casino and receptor R7. The figure shows that operational noise levels would be in compliance with the daytime WAC  $L_{eq}$  (equivalent averaged sound level) limit of 57 dBA at all identified receptor locations. **Figure 4.11-3** shows the model results for nighttime operational noise levels for Alternative A. In addition to the typical daytime noise control measures, this figure represents typical nighttime noise control that includes prohibiting heavy truck traffic to the loading dock and no operation of diesel engine generator sets during nighttime hours (10 p.m. to 7 a.m.; except for emergency power generation). **Figure 4.11-3** shows that operational noise levels of Alternative A would be in compliance with the nighttime WAC  $L_{eq}$  limit of 47 dBA at all identified receptor locations. Therefore, as on-site operational noise levels resulting from Alternative A would be in compliance with all State limits, impacts would not be significant. No mitigation is required.

### *Traffic Noise*

Using the FHWA Traffic Noise Prediction Model described in **Section 3.11-3**, traffic noise levels were predicted for Alternative A for the year 2030 at 17 locations near the La Center Interchange Site. The positions of the noise modeling locations are shown in **Figure 3.11-1** and results are included in **Table 4.11-2**. Noise level projections for 2030 are also included for the No Action Alternative (Alternative F).

**Table 4.11-2** shows that there is little difference in the predicted residential noise levels between Alternative F (No Action) and Alternatives A and B. Traffic noise levels that exceed the NAC levels occur at Map ID locations 1, 14, and 16 for all three of these alternatives. This indicates that noise impacts are not caused by Alternative A, but are attributed to outside factors. No mitigation is required.

## **4.11.3 ALTERNATIVE B – PREFERRED PROJECT WITHOUT REROUTING NW 319<sup>TH</sup> STREET**

### *CONSTRUCTION NOISE IMPACTS*

Because the noise generated by the mass earthwork phase was modeled as an area source completely covering the project site, noise generation resulting from the construction of Alternative B is identical to that of Alternative A. The estimated construction noise levels during the mass earthwork phase of Alternative B are shown in **Figure 4.11-1** for the La Center Interchange Site. The construction noise levels at the closest residential areas for both sites are predicted to be generally in the range of 63 dBA to 73 dBA. Noise levels during the other construction phases would be only 1 dBA to 3 dBA lower. Construction activities are exempt from the WAC daytime limits (7 a.m. to 10 p.m.). However, the nighttime WAC limits do apply to construction activities and these levels are all well above the WAC limit 47 dBA during the nighttime. This is considered a significant impact. Implementation of mitigation measures in **Section 5.0** would ensure that nighttime construction noise impacts are reduced to less than significant.

**Figure 4.11-3**

**TABLE 4.11-2**  
TRAFFIC NOISE MODELING RESULTS (L<sub>EQ</sub> DBA) – ALTERNATIVE A

MAP ID	NAC	Existing (2005)	Alternative F (2030)		Alternative A (2030)		
			Level	Difference from Existing	Level	Difference from Existing	Difference from No Action
1	66	64	<b>66</b>	2	<b>66</b>	2	0
2	66	62	63	1	64	2	1
3	66	51	53	2	54	3	1
4	66	52	53	1	54	2	1
5	66	50	52	2	53	3	1
6	66	49	51	2	52	3	1
7	66	50	52	2	56	6	4
8	66	49	51	2	55	6	4
9	66	47	49	2	51	4	2
10	66	45	47	2	48	3	1
11	66	47	49	2	50	3	1
12	66	48	49	1	52	4	3
13	66	54	55	1	57	3	2
14	66	<b>68</b>	<b>70</b>	2	<b>71</b>	3	1
15	66	54	56	2	57	3	1
16	66	65	<b>70</b>	5	<b>70</b>	5	0
17	66	53	57	4	59	6	2

Note: **BOLD** exceeds the noise abatement criteria (NAC).

Source: CH2MHill, 2005.

### **OPERATIONAL NOISE IMPACTS**

#### ***On-Site Operations Noise***

The development proposed under Alternative B is very similar to that proposed under Alternative A, with some changes in project layout that would have minimal effect on project noise. For this reason it is assumed that Alternative B will have the same on-site operational noise impacts as Alternative A. These impacts are shown in **Figures 4.11-2** and **4.11-3**. These figures show that operational noise levels would be in compliance with the daytime WAC L<sub>eq</sub> limit of 57 dBA and the nighttime WAC L<sub>eq</sub> limit of 47 dBA at all identified receptor locations. Therefore, on-site operational noise levels resulting from Alternative B would not have a significant impact because they would be in compliance with all State limits. No mitigation is required.

#### ***Traffic Noise***

The results of the Traffic Noise Prediction Model, as described in **Section 3.11-3**, are included in **Table 4.11-3**. As with Alternative A, traffic noise levels that exceed the NAC levels for Alternative B occur at Map ID locations 1, 14, and 16. The NAC is exceeded at the same three locations under

the No Action Alternative (Alternative F). This indicates that noise impacts are not caused by Alternative B, but are attributed to outside factors. No mitigation is required.

**TABLE 4.11-3**  
TRAFFIC NOISE MODELING RESULTS (L<sub>EQ</sub> DBA) – ALTERNATIVE B

MAP ID	NAC	Existing (2005)	Alternative F (2030)		Alternative B (2030)		
			Level	Difference from Existing	Level	Difference from Existing	Difference from No Action
1	66	64	<b>66</b>	2	<b>66</b>	2	0
2	66	62	63	1	64	2	1
3	66	51	53	2	54	3	1
4	66	52	53	1	54	2	1
5	66	50	52	2	53	3	1
6	66	49	51	2	52	3	1
7	66	50	52	2	56	6	4
8	66	49	51	2	55	6	4
9	66	47	49	2	50	3	1
10	66	45	47	2	48	3	1
11	66	47	49	2	50	3	1
12	66	48	49	1	50	2	1
13	66	54	55	1	56	2	1
14	66	<b>68</b>	<b>70</b>	2	<b>71</b>	3	1
15	66	54	56	2	57	3	1
16	66	65	<b>70</b>	5	<b>70</b>	5	0
17	66	53	57	4	59	6	2

Note: **BOLD** exceeds the noise abatement criteria (NAC).

Source: CH2MHill, 2005.

#### 4.11.4 ALTERNATIVE C – REDUCED INTENSITY

##### *CONSTRUCTION NOISE IMPACTS*

Alternative C takes place on the same project site as Alternatives A and B. Because the noise generated by the mass earthwork phase was modeled as an area source completely covering the project site, noise generation resulting from the construction of Alternative C is identical to that of Alternatives A and B. The estimated construction noise levels during the mass earthwork phase of Alternative C are shown in **Figure 4.11-1** for the La Center Interchange Site. The construction noise levels at the closest residential areas for both alternative project sites are predicted to be generally in the range of 63 dBA to 73 dBA. Although construction activities are exempt from the WAC daytime limits (7 a.m. to 10 p.m.), the nighttime WAC limits do apply. These levels are all well above the WAC limit of 47 dBA during the nighttime. This is considered a significant impact. Implementation of mitigation measures in **Section 5.0** would ensure that nighttime construction noise impacts are reduced to less than significant.

### **OPERATIONAL NOISE IMPACTS**

#### ***On-Site Operations Noise***

Alternative C shares the same types of land uses as Alternatives A and B, although the casino and hotel facilities are smaller with correspondingly lower traffic numbers expected. Therefore, noise levels would be similar to those for Alternatives A and B, except that the on-site traffic noise contribution would be slightly lower than what is shown in **Figures 4.11-2** and **4.11-3**. As with Alternatives A and B, it is expected that with typical noise control, on-site operational noise levels would be in compliance with the WAC  $L_{eq}$  limit of 57 dBA and the nighttime limit of 47 dBA at all of the identified receptors. Therefore, on site operational noise levels resulting from Alternative C would not have a significant impact because they would be in compliance with all State limits. No mitigation is required.

#### ***Traffic Noise***

The results of the Traffic Noise Prediction Model for Alternative C are included in **Table 4.11-4**. The future projections include noise levels that would occur with Alternative C and Alternative F (No Action).

As with Alternatives A and B, **Table 4.11-4** shows that there is little difference in the predicted residential noise levels between Alternative F (No Action) and Alternative C. Traffic noise levels that exceed the NAC levels occur at Map ID locations 1, 14, and 16 for both of these alternatives. This indicates that noise impacts are not caused by Alternative C, but are in fact, attributed to outside factors. No mitigation is required.

### **4.11.5 ALTERNATIVE D – BUSINESS PARK**

#### ***CONSTRUCTION NOISE IMPACTS***

Because the noise generated by the mass earthwork phase was modeled as an area source completely covering the project site, noise generation resulting from the construction of Alternative D is identical to that of Alternatives A, B, and C. The estimated construction noise levels during the mass earthwork phase of Alternative B are shown in **Figure 4.11-1** for the La Center Interchange Site. The construction noise levels at the closest residential areas for both alternative project sites are predicted to be generally in the range of 63 dBA to 73 dBA. Noise levels during the other construction phases would be only 1 dBA to 3 dBA lower. Although construction activities are exempt from the WAC daytime limits (7 a.m. to 10 p.m.), the nighttime WAC limits do apply. These levels are all well above the WAC limit of 47 dBA during the nighttime. This is considered a significant impact. Implementation of mitigation measures in **Section 5.0** would ensure that nighttime construction noise impacts are reduced to less than significant.

**TABLE 4.11-4**  
TRAFFIC NOISE MODELING RESULTS (L<sub>EQ</sub> DBA) – ALTERNATIVE C

MAP ID	NAC	Existing (2005)	Alternative F (2030)		Alternative C (2030)		
			Level	Difference from Existing	Level	Difference from Existing	Difference from No Action
1	66	64	<b>66</b>	2	<b>66</b>	2	0
2	66	62	63	1	64	2	1
3	66	51	53	2	54	3	1
4	66	52	53	1	54	2	1
5	66	50	52	2	54	4	2
6	66	49	51	2	53	4	2
7	66	50	52	2	57	7	5
8	66	49	51	2	55	6	4
9	66	47	49	2	50	3	1
10	66	45	47	2	48	3	1
11	66	47	49	2	50	3	1
12	66	48	49	1	51	3	2
13	66	54	55	1	57	3	2
14	66	<b>68</b>	<b>70</b>	2	<b>71</b>	3	1
15	66	54	56	2	57	3	1
16	66	65	<b>70</b>	5	<b>70</b>	5	0
17	66	53	57	4	59	6	2

Note: **BOLD** exceeds the noise abatement criteria (NAC).

Source: CH2MHill, 2005.

### **OPERATIONAL NOISE IMPACTS**

#### ***On-Site Operations Noise***

Alternative D would consist of developing the La Center Interchange Site for office, warehousing, and some commercial use. Peak hour on-site traffic would be similar to that for Alternatives A and B, but other sources associated with Alternatives A, B, and C would not be present. Office and commercial installations, like those included in Alternative D usually do not require the emergency diesel power and nighttime operational hours of casino operations. Therefore, the on-site operational noise for Alternative D would be lower than Alternatives A, B, and C. This would be in compliance with the WAC L<sub>eq</sub> limits of 57 dBA for daytime and 47 dBA for nighttime. Therefore, on-site operational noise levels resulting from Alternative D would not have a significant impact because they would be in compliance with all State limits. No mitigation is required.

#### ***Traffic Noise***

The results of the Traffic Noise Prediction Model for Alternative D are included in **Table 4.11-5**. The future projections include noise levels that would occur with Alternative D and with the No Action Alternative (Alternative F).

As with Alternatives A, B, and C, **Table 4.11-5** shows that there is little difference in the predicted residential noise levels between the No Action Alternative (Alternative F) and Alternative D. Traffic noise levels that exceed the NAC levels occur at Map ID locations 1, 14, and 16 for both of these alternatives. This indicates that noise impacts are not caused by Alternative D, but are attributed to outside factors. No mitigation is required.

**TABLE 4.11-5**  
TRAFFIC NOISE MODELING RESULTS (L<sub>EQ</sub> DBA) – ALTERNATIVE D

MAP ID	NAC	Existing (2005)	Alternative F (2030)		Alternative D (2030)		
			Level	Difference from Existing	Level	Difference from Existing	Difference from No Action
1	66	64	<b>66</b>	2	<b>66</b>	2	0
2	66	62	63	1	64	2	1
3	66	51	53	2	54	3	1
4	66	52	53	1	54	2	1
5	66	50	52	2	54	4	2
6	66	49	51	2	52	3	1
7	66	50	52	2	58	8	6
8	66	49	51	2	55	6	4
9	66	47	49	2	50	3	1
10	66	45	47	2	48	3	1
11	66	47	49	2	50	3	1
12	66	48	49	1	51	3	2
13	66	54	55	1	57	3	2
14	66	<b>68</b>	<b>70</b>	2	<b>71</b>	3	1
15	66	54	56	2	57	3	1
16	66	65	<b>70</b>	5	<b>70</b>	5	0
17	66	53	57	4	59	6	2

Note: **BOLD** exceeds the noise abatement criteria (NAC).

Source: CH2MHill, 2005.

#### 4.11.6 ALTERNATIVE E – RIDGEFIELD INTERCHANGE SITE

##### CONSTRUCTION NOISE IMPACTS

The estimated construction noise levels during the mass earthwork phase are shown in **Figure 4.11-4** for the Ridgefield Interchange Site. Specific residential areas near the sites are labeled “Rx” on the figures. The construction noise levels at the closest residential areas for the site are predicted to be generally in the range of 63 dBA to 73 dBA. Noise levels during the other construction phases would be only 1 dBA to 3 dBA lower. Construction activities are exempt from the WAC daytime limits.

**Figure 4.11-4**

However, the nighttime WAC limits do apply to construction activities and these levels are all well above the NAC level of 47 dBA. This is considered a significant impact. Implementation of mitigation measures in **Section 5.0** would ensure that nighttime construction noise impacts are reduced to less than significant.

#### ***OPERATIONAL NOISE IMPACTS***

##### ***On-Site Operations Noise***

Alternative E proposes on-site development similar to Alternatives A and B, except that it would be located at the Ridgefield Interchange Site and there would be no wastewater treatment plant. For this alternative project site, there are nearby residences at distances similar to Alternatives A and B. The results of the initial modeling of the daytime operational noise from Alternative E are shown in **Figure 4.11-5**. This figure represents equipment and activities with typical noise control. This includes diesel engine silencers, and a noise barrier between the casino and receptor R2. The figure shows that operational noise levels associated with Alternative E would be in compliance with the daytime WAC  $L_{eq}$  limit of 57 dBA at all identified receptor locations. **Figure 4.11-6** shows the model results for nighttime operational noise levels. In addition to the typical daytime noise control measures, this figure represents typical nighttime noise control that includes no operation of diesel engine generator sets during nighttime hours (except for emergency power generation). As shown in **Figure 4.11-6**, operational noise levels of Alternative E would be in compliance with the nighttime WAC  $L_{eq}$  limit of 47 dBA at all identified receptor locations. Because on-site operational noise levels resulting from Alternative E would be in compliance with all State limits, impacts will not be significant. No mitigation is required.

##### ***Traffic Noise***

Using the FHWA Traffic Noise Prediction Model described in **Section 3.11-3**, traffic noise levels were predicted for the year 2030 at five locations near the Ridgefield Interchange Site. The position of the noise modeling locations can be seen in **Figure 3.11-2**. The results of the Traffic Noise Prediction Model are included in **Table 4.11-6**. The future projections include noise levels that would occur with Alternative E and the No Action Alternative (Alternative F). **Table 4.11-6** shows that there is little difference in the predicted residential noise levels between the No Action Alternative (Alternative F) and Alternative E. Traffic noise levels that exceed the NAC levels occur at Map ID locations 18, 19, 20 and 21 for both of these alternatives. This indicates that noise impacts are not caused by Alternative E, but are attributed to outside factors. No mitigation is required.

**Figure 4.11-5**

**Figure 4.11-6**

**TABLE 4.11-6**  
TRAFFIC NOISE MODELING RESULTS (L<sub>EQ</sub> DBA) – ALTERNATIVE E

MAP ID	NAC	Existing (2005)	Alternative F (2030)		Alternative E (2030)		
			Level	Difference from Existing	Level	Difference from Existing	Difference from No Action
18	66	<b>66</b>	<b>69</b>	3	<b>70</b>	4	1
19	66	63	<b>66</b>	3	<b>67</b>	4	1
20	66	<b>67</b>	<b>70</b>	3	<b>71</b>	4	1
21	66	63	<b>66</b>	3	<b>66</b>	3	0
22	66	57	60	3	60	4	0

Note: **BOLD** exceeds the noise abatement criteria (NAC).

Source: CH2MHill, 2005.

#### 4.11.7 ALTERNATIVE F – NO ACTION

##### *CONSTRUCTION NOISE IMPACTS*

Under Alternative F, no development would occur as a result of the project at the La Center Interchange or Ridgefield Interchange Sites. Therefore, no construction noise impacts are associated with Alternative F.

##### *OPERATIONAL NOISE IMPACTS*

###### *On-Site Operational Noise*

As no development is proposed under Alternative F, no impacts from on-site noise operations would occur.

###### *Traffic Noise*

Using the FHWA Traffic Noise Prediction Model described in **Section 3.11-3**, traffic noise levels were predicted for the year 2030 at 22 locations near the La Center and Ridgefield Interchange Sites (**Tables 4.11-2** through **Table 4.11-6**). The results indicate that noise impacts are predicted to exceed the NAC levels at some locations by the year 2030 even without development of the project alternatives.